

Mössbauer study of the magnetic phase composition of single-crystalline rutile (TiO₂) implanted with iron ions

Dulov E., Ivoilov N., Khripunov D., Tagirov L., Khaibullin R., Valeev V., Nuzhdin V.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Depth-resolved Mössbauer measurements have been performed for four ferromagnetic samples obtained by the implantation of iron ions (enriched to ~ 50% with ⁵⁷Fe isotope) into single-crystalline rutile (TiO₂) substrates with two crystallographic orientations [(100) and (001)] at different temperatures (300 and 900 K). It is established that the ferromagnetic properties of iron-implanted rutile samples at room temperature are determined by the presence of α -Fe and Fe₃O₄ phases. The phase composition of samples obtained by iron implantation into substrates heated to 900 K depends on the crystallographic orientation of the substrate, which is explained by a significant anisotropy of the diffusion of iron atoms in rutile. © Pleiades Publishing, Ltd., 2009.

<http://dx.doi.org/10.1134/S1063785009060017>
